

Critical Digest.

ANATOMICAL, PHYSIOLOGICAL AND PATHOLOGICAL NOTES.

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EXPERIMENTAL AND PATHOLOGICAL ANATOMICAL INVESTIGATIONS ON THE VISUAL CENTRES AND TRACTS, TOGETHER WITH CLINICAL CONTRIBUTIONS TO CORTICAL HEMIANOPSIA AND ALEXIA.

Dr. C. v. Monakow (*Archiv f. Psychiatrie*, etc., Bd. xxiii., two plates). The author's contributions to the finer anatomy of those parts of the brain mediating vision are known and his conclusions, in large part, accepted.

In this paper he presents further evidence that the relations of the primary visual centres to the optic tract and occipital cortex, are in man fundamentally the same as in the rabbit, cat and dog. In these animals he has shown that injury to the occipital cortex or to the optic tract causes secondary degenerations in the anterior corpora quadrigemina, the pulvinar and the corpus geniculatum externum. These, then, are the primary visual centres. As the title indicates, the cases which are described bear also on the explanations to be given of hemianopsia and alexia. By way of introduction, he points out that there is no essential difference in the secondary degenerations which may be experimentally produced in new-born or in adult animals of the same species. The degeneration is greater, however, in the new-born. At the same time between the several classes of animals examined there are significant differences.

Upon removing, for example, the occipital cortex from a dog or cat, the secondary degeneration passes the primary centres and involves the optic tract. In the rabbit the tract is not thus involved. In other words, the primary centres are less dependent on the cortex in the lower class. As might be expected, the

relations in man most nearly resemble those in the dog and cat.

v. Monakow has three new cases bearing on his main point. The clinical history, autopsy record, and microscopical examination are given for each case with ample detail. The following is a condensed statement of the facts and conclusions:

CASE I.—Male, 67 years. Previous attacks of ophthalmic migraine. 1879—apoplectic seizure, with subsequent left-sided, bilateral hemianopsia. Ophthalmoscopic examination negative. Death, 1886. Autopsy: Focus of softening in the region of the right fissura calcarina (cuneus); old and well-marked secondary degeneration of the right optic radiation, the right pulvinar, corpus geniculatum externum, anterior corpus quadrigeminum, and the right tractus opticus. Secondary degeneration of the right fornix and the right corpus mammillare.

We have here a complete and almost isolated degenerative destruction of the entire central visual apparatus. Even the right optic tract was fully (!) degenerated. The cells also in the primary centres were in large part degenerated.

The primary lesion extended so deeply into the white substance as to involve the peduncle of the cuneus. As a result, the associated cortex region was somewhat degenerated, but in a peculiar way. The fully sclerosed portions (cuneus, lobulus lingualis, and first occipital gyrus) were clearly indicated, while the process could be traced with decreasing intensity into the second and third occipital gyri and the first and second parietal.

In the very complete degeneration of the primary centres the author sees an indication that the entire cortex on which they depend has been thrown out of function. If such is the case the affected portions of the cortex must constitute the cortical visual area; and this, according to his description just given, is more extensive than that usually described. Considering the very complete degeneration of the right optic tracts, it is interesting to note with regard to the hemianopsia that the line of division did not pass through the fixation point, but ten degrees outside of it.

CASE II.—Female, 16 years. In the fourth month of life, convulsions. At a year and a half, acute brain disease, with subsequent deaf-mutism. Slight idiocy. Capable of speaking, reading and writing. Death from pneumonia. Autopsy—brain: Old and extensive hydro-

cephalic enlargement of the left posterior and inferior cornua on the left side; atrophy of the occipito-temporal lobe. Secondary degeneration of the optic radiation, the left posterior corpus quadrigeminum, and both corpus geniculatum internum and externum and optic tract.

In this case attention is specially directed to the fact that a localized hydrocephalic disturbance, associated with a diffuse ependymitis, was able to cause through disturbance of the cortex, a secondary degeneration in some of the primary visual centres. The special point of interest, however, lies in the fact that v. Monakow has previously pointed out that within the corpus geniculatum externum certain cells lying ventrad degenerate with special ease after lesions of the cortex, while those lying dorsad do not do so, the latter being specially associated with the optic tract. In this case the ventral group was degenerated, while the dorsal group was apparently intact.

CASE III.—Male, 62 years. Landscape-painter, previously healthy. 1884—attack of apoplexy, followed by transient paresis on the right side, with permanent, but incomplete right-sided hemianopsia, alexia and paraphasia. Powers of visualization weakened. Death, 1889. Autopsy: Softening in the left angular gyrus and praecuneus; the left cuneus not involved; secondary degeneration in the dorsal portion of the left optic radiation, in the left corpus geniculatum externum and optic thalamus and in the anterior corpus quadrigeminum. Slight atrophy of the left optic tract.

The region of softening was occupied by a large cyst, surrounded by smaller ones, and was located in the gyrus angularis and the superior parietal lobule. The disturbance had penetrated the white substance to a sufficient depth to involve the dorsal portion of the sagittal fibres forming the optic radiation. The cause was a thrombosis of the posterior branch of the left Sylvian artery.

Macroscopically the lesion was sharply bounded, but microscopically it was extensive.

For the most part, however, these extensions were along definite tracts, thus showing their secondary character.

The cuneus and lobulus lingualis were normal, and the fibres from them to the primary centres were not degenerated. The main portion of the visual area was, therefore, free from degeneration. The reduction of the field of vision was very marked, nevertheless. For

this he holds the gyrus angularis and the second occipital gyrus, O_2 , responsible.

Without invoking a visual word centre as distinct from a visual object centre, he seeks to explain the peculiar symptoms of this case by a disturbance of association. Reading involves at least a revival of visual, auditory and motor memories. In this case the direct association of the visual and auditory centres in the left hemisphere was apparently interrupted and in accordance with the idea which he develops at some length, an impulse passing between these two centres must in this instance travel by way of the right hemisphere. This longer and unusual course is in his estimation one factor in causing the dyslexia. To this may perhaps be added the disturbance in the movements of the eyes necessary for reading.

To sum up, these cases show a relation between the visual cortex and primary centres similar to that which has been experimentally determined in the cat and dog. They show that lesions in widely separated localities may cause hemianopsia, and that on the one hand, therefore, the hemianopsia in these cases had not an exact localizing value; while, on the other hand, they suggest that the visual cortex extends onto the convex surface some distance beyond the cuneus and the regions immediately surrounding it. An explanation for dyslexia is offered which renders superfluous the assumption of a visual word centre, separate from the visual centre for objects.

Case I. also shows the secondary degeneration of gray matter, a fact which should be reiterated until it is accepted. In case II. the degeneration appears to be due to a localized distension in the left occipito-temporal region. The field of vision was not examined in this case.